

Title: Patterns All Around Us

Brief Overview:

The focus of this unit will be on patterns, functions, relations and problem solving. Students will apply their knowledge of basic geometrical shapes. They also will create their own pattern for African garments based on their investigation of African patterns in books and magazines.

NCTM 2000 Principles for School Mathematics:

- **Equity:** *Excellence in mathematics education requires equity - high expectations and strong support for all students.*
- **Curriculum:** *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*
- **Teaching:** *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*
- **Learning:** *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*
- **Assessment:** *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*
- **Technology:** *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

• Content Standards

Number and Operations

- *Understand numbers, ways of representing numbers with relationships among numbers, and number systems.*
- *Understand meanings of operations and how they relate to one another.*
- *Compute fluently and make reasonable estimates.*

Algebra

- *Understand patterns, relationships, and functions.*
- *Represent and analyze mathematical situations and structures using algebraic symbols.*

Data Analysis and Probability

- *Develop and evaluate inferences and predictions that are based on data.*
- *Understand and apply basic concepts of probability.*

- **Process Standards**

- **Problem Solving**

- *Apply and adapt a variety of appropriate strategies to solve problems.*
 - *Build new mathematical knowledge through problem solving.*

- **Reasoning and Proof**

- *Recognize reasoning and proof as fundamental aspects of mathematics.*
 - *Make and investigate mathematical conjectures.*

- **Communication**

- *Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.*
 - *Analyze and evaluate mathematical thinking and strategies of others.*

- **Connections**

- *Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.*
 - *Recognize and apply mathematics in contexts outside of mathematics.*

- **Representation**

- *Create and use representations to organize, record, and communicate mathematical ideas.*
 - *Use representations to model and interpret physical, social, and mathematical phenomena.*

Grade/Level:

Grades 3 – 4

Duration/Length:

Three days, 45 minutes- hour per day

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Problem solving strategies
- Basic geometrical shapes and colors
- Recognizing patterns

Student Outcomes:

Students will:

- identify patterns and pattern characteristics.
- create a design using patterns.
- identify more complex geometrical shapes – hexagon, trapezoid, parallelogram, and rhombus.
- know 4 and 7 multiplication facts.

Materials/Resources/Printed Materials:

- Pattern blocks
- Pattern examples
- Sentence strips
- Hundreds chart
- Crayons/markers
- Student Activity Sheets 1-3
- Markers, Crayons

Development/Procedures:

Day 1

SHAPE PATTERNS

- Begin the lesson by showing examples of patterns...(i.e., the stripes in the flag, clothing, wallpaper, objects in the room.)
- Define **pattern**, as something that repeats.
- Introduce geometric shapes using paper cutouts that can be applied to a Velcro board.
 - “Pull out the yellow shape.” Ask, “How many sides does it have?”
 - “This is a hexagon.” Proceed until all 6 shapes are on the board.
 - Model creating a pattern while students replicate your design on their desk
 - Instruct them to repeat the pattern 3 times, using geometric shapes from the pattern bucket.
 - Ask, “What is the pattern?” Triangle, square, triangle, square, triangle, square...
 - Walk around to check students’ work.
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 - Point out the core as being the smallest unit of a pattern.
 - Allow students to create patterns at their desk and play a game recreating the patterns of their classmates within groups.
- Introduce pattern types (i.e., repeating- ABCABC..., triangle, square, hexagon, triangle, square, hexagon...and growing- ABAABAAABAAAAB...triangle, square, triangle, triangle, square, triangle, triangle, triangle, square...)
- Distribute Pattern Activity Sheets (Student Activity Sheets 2,3).

- Reflect with a journal entry.
- Students will create a pattern using pattern block stickers on sentence strips. They will write pattern type (ABBABB) on the opposite side of the strip.
 - Students will exchange pattern strips and state the pattern the other student created.

Extension: Build upon the lesson with relationship of geometrical shapes found in the environment (i.e., street signs, buildings, floor tiles, objects used around the house).

DAY 2 COUNTING PATTERNS

- Count orally by 10's, 5's, and 2's.
- As a class, using multiples of 4, begin skip counting.
- Use the hundreds chart and crayons to model with each student.
- On the chalkboard write out the multiplication sentence and product so students can see the pattern visually. (i.e., $1 \times 4 = 4$, $2 \times 4 = 8$...)
- "What are the next four lines in the table?"
- "Can you see a pattern in the sequence?"
- Recognize the multiples of 4 by shading the number by crayons, in order to see the pattern.
- To reinforce pattern, allow students to do multiples of 3 on the hundreds chart.
- Group Activity
 - Give multiplication word problems and allow the class to use each other as manipulatives to get the answer.
 - For example, I have five bowls with two goldfish in each bowl. How many goldfish do I have?
 - Multiples of 4 activity sheet. (Students can use manipulatives to compute answer.)
- Have different groups repeat activity with other multiples to see all the different patterns generated.
- Display by 2's, 3's, 4's, 5's...
- Discuss results.

Extension: Make the connection of counting patterns with beats in music. Have a student who plays a musical instrument demonstrate various counting techniques and patterns in music.

Day 3 FABRIC PATTERNS

- Introduce the lesson by reading a story that relates to African patterns or garments. (author/title will be inserted in November)
- Incorporate culture into the unit by having students design an African pattern that could be used on traditional African garment (i.e. dashiki). Have samples of African patterns from books, magazines and fabric samples to help student's generate ideas.
- Students will create an original design based on the following decisions:
 - What geometric shapes should be used?
 - Should all shapes be equal in size?

- What colors can be used?
- How often will the shapes, sizes, and colors repeat in the pattern?
- Materials: Sentence strips, markers, crayons.
- The teacher will give the following directions to the students:
Draw the shapes you have chosen on a sentence strip using the guidelines provided.
Repeat the patterns as many times utilizing the entire strip. Color the shapes using markers and crayons. Design should have bright and lively colors reminiscent of the African culture.

Extension: Compare patterns from other cultures with the design students created.
Discuss the various shapes identified in fabrics around the world.

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Patterns Around the World

It takes 1 unit to create 6 apartments, 2 units to create 11, 3 units to create 16 apartments and 4 units for 21 apartments. Given this information, how many apartments will there be after 8 units are made?

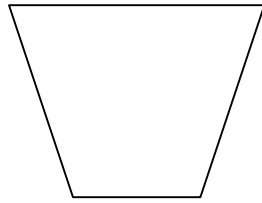
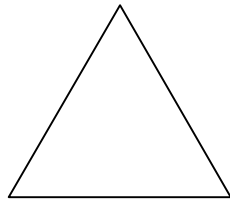
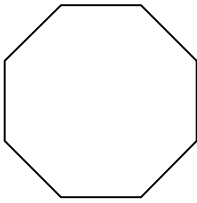


The contractor has received additional money to build more units. How many apartments will be available after 6 more units are constructed?

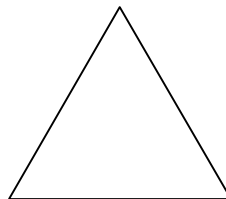
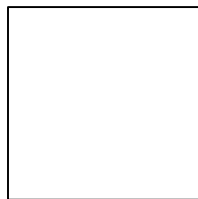
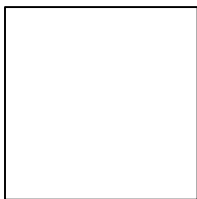
PATTERN TYPES
Patterns Around the World

***Given the following geometrical shapes repeat the following pattern.**

1.



2.



PATTERN TYPES
Patterns Around the World

Continue the following pattern types 5 additional terms.

3. AABB

4. ABC

5. ABAC

6. ABBC